

CLAIMS

## WHAT IS CLAIMED IS:

1. A powered air cleaning system comprising:
  - a flow path extending through the system from an inlet to an outlet;
  - 5 a motor-driven fan located along the flow path to draw particulate debris laden air into the inlet and rotate it about an axis to form a rotating flow that stratifies the debris laden air with the heaviest particles in the outermost orbits of the rotating flow;
  - an ejector port for ejecting particulate debris laden air from the stratified rotating flow in the system;
  - 10 an air filter located within the rotating flow and across the flow path upstream of the outlet for filtering air from the innermost orbits of the stratified rotating flow;
  - wherein the system includes at least one component defining a portion of the flow path through the system, which component is separable from the system.
- 15 2. The air cleaning system according to claim 1, wherein the at least one component is selected from the group consisting of a detachable fan housing containing the motor-driven fan and a detachable filter housing containing the air filter.
- 20 3. The air cleaning system according to claim 2, including both a detachable fan housing and a detachable filter housing.
4. The air cleaning system according to claim 3, wherein the fan housing and the filter housing are detachably connected to each other.

5        5.        The air cleaning system according to claim 3, further comprising an intermediate pipe assembly forming a portion of the flow path, the fan housing and the filter housing being detachably connected to respective ends of the intermediate pipe assembly.

10        6.        The air cleaning system according to claim 5, further comprising a compression assembly located in the filter housing upstream of the air filter for compressing the volume of the rotating flow of debris laden air to increase the air velocity and centrifugal force acting on the airborne particles.

7.        The air cleaning system according to claim 6, wherein the compression assembly provides support for an upstream end of the air filter.

15        8.        The air cleaning system according to claim 6, wherein the compression assembly includes a plurality of stationary vanes in the flow path.

20        9.        The air cleaning system according to claim 5, further comprising a compression assembly located in the fan housing for compressing the volume of the rotating flow of debris laden air to increase the air velocity and centrifugal force acting on the airborne particles.

10.       The air cleaning system according to claim 9, wherein the compression assembly provides support for the motor-driven fan.

11. The air cleaning system according to claim 9, wherein the compression assembly includes a plurality of stationary vanes in the flow path.

5 12. The air cleaning system according to claim 1, further comprising a separator-ejector chamber in the flow path downstream of the motor-driven fan, the outermost orbits of the rotating flow riding on an outer wall of the separator-ejector chamber to the ejector port.

10 13. The air cleaning system according to claim 12, wherein the filter is located centrally within the separator-ejector chamber and is elongated in the direction of the axis about which the debris laden air is rotated.

15 14. The air cleaning system according to claim 13, wherein the at least one component which is separable from the system includes a filter housing detachably connected to the system, the filter housing containing the separator-ejector chamber, air filter and the ejector port.

20 15. The air cleaning system according to claim 13, wherein an outer peripheral surface of the elongated filter is cylindrical.

16. A powered air cleaning system comprising:  
a flow path extending through the system from an inlet to an outlet;

a motor-driven fan located along the flow path to draw particulate debris laden air into the inlet and rotate it about an axis to form a rotating flow that stratifies the debris laden air with the heaviest particles in the outermost orbits of the rotating flow;

an ejector port for ejecting particulate debris laden air from the stratified  
5 rotating flow in the system;

an air filter located within the rotating flow and across the flow path upstream of the outlet for filtering air from the innermost orbits of the stratified rotating flow;  
and

an intermediate pipe assembly forming a portion of the flow path between the  
10 motor-driven fan and the air filter so the fan and filter can be remote from one another.

17. The air cleaning system according to claim 16, further comprising a compression assembly located along the flow path between the intermediate pipe  
15 assembly and the air filter for compressing the volume of the rotating flow of debris laden air to increase the air velocity and centrifugal force acting on the airborne particles.

18. The air cleaning system according to claim 17, wherein the  
20 compression assembly provides support for an upstream end of the air filter in the flow path of the system.

19. The air cleaning system according to claim 17, wherein the compression assembly includes a plurality of stationary vanes in the flow path.

20. The air cleaning system according to claim 16, further comprising a fan housing containing the motor-driven fan, the fan housing being detachably connected to an upstream end of the pipe assembly.

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21. The air cleaning system according to claim 16, further comprising a filter housing containing the air filter, the filter housing being detachably connected to a downstream end of the pipe assembly.

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22. A method of making a powered air cleaning system comprising:

forming a powered air cleaning system as a plurality of components, each defining a respective portion of a flow path through the system from an inlet to an outlet, the components including first and second components, the first component having a motor-driven fan located along the flow path to draw particulate debris laden air into the inlet and rotate it about an axis to form a rotating flow that stratifies the debris laden air with the heaviest particles in the outermost orbits of the rotating flow, and the second component having a separator-ejector chamber in the flow path downstream of the motor-driven fan, an air filter located within the separator-ejector chamber and across the flow path upstream of the outlet for filtering air from the innermost orbits of the stratified rotating flow, and an ejector port for ejecting particulate debris laden air from the stratified rotating flow in the system;

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separately mounting the first and second components in remote locations in a device to be supplied with clean air; and

interconnecting the flow path through the first and second components with an intermediate pipe assembly which forms a portion of the flow path of the system.

23. The method according to claim 22, including providing a compression  
5 assembly in the second component upstream of the air filter for compressing the volume of the rotating flow of debris laden air to increase the air velocity and centrifugal force acting on the airborne particles.